POPULAR Computing WEEKLY

17 June 1982 Vol 1 No 9

30p

Othello on ZX81



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Spectrum graphics

BBC sound

Introduction to Basic

Home computers compared



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Centipede In all I think this is the best presented moving graphics program I've yet seen. Phil Garratt Interface
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How to submit articles
Articles which are submitted for publication should not be more than 1000 words long

All submissions should be typed and a double space should be left between each line

Programs should, whenever possible, be computer printed

At present we cannot guarantee to return every submitted article so please keep a copy

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish although we will always try our best to make sure programs work

This Week



Cover illustration by Stuart Hughes

Editorial

Since we launched this magazine, only nine weeks ago we have been surprised by the standard of the programs which you send in

We have already criticised the number of blood-thirsty programs we receive. But, on reflection, what is surprising is the speed at which newcomers to home computing learn to program at quite an advanced level

The limitations of Basic as a language for programming must, by now, be clear to most of you

It is easy to learn and so is a good introduction But it is very, very slow and it takes up far too much valuable memory space

The answer is to have the courage to jump in at the deep end and start programming in machine code

It is not easy — it takes a fair bit of effort and commitment to come to grips with it. But that effort is well rewarded

To help you along we will be far more willing to accept machine code programs for publication

Next Week



From a missile base on Atlantis you must do battle with an enormous monster of the deeps in a new game called *Shark Attack*

Classified

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The Micro-Ed from Lucas

New Nascom goes for class

Lucas Logic has announced a new version of the Nascom 2 microcomputer, the Micro-Ed.

There are already several thousand Nascom 2s in use in secondary education and it is for such applications that the Micro-Ed is designed.

With this use in mind the re-packaged and improved Nascom 2 is housed in a sturdy black structural foam plastic case. It is completely self-contained with the power supply within the casing.

The Micro-Ed has 8K of user RAM and can be used either as a cassette based system or as part of a more advanced installation, using the newly developed Lucas networking system.

This NAS NET networking system allows the use of up to 32 Micro-Ed machines with a control Nascom 3 — perhaps with disk storage and printer output.

The range of software and hardware currently available for the Nascom 2 will be compatible with the new Micro.

The basic Micro-Ed costs £399 plus VAT and orders will be fulfilled within 28 days. The networking system should be available by the end of July.

More information from Lucas Logic Ltd, Welton Road, Wedgnock Industrial Estate, Warwick.

Phoenix rises for the ZX81

Winged Avenger, a version of the arcade game, *Phoenix* written for the ZX81, with seven levels of play from reasonable to sadistic has now been produced for £5.95 by Work Force, 140 Wilsden Avenue, Luton.

Design flaw halts Spectrum delivery

By David Kelly

Production of the new Sinclair Spectrum has been halted and dispatch of the micro to the 17,000 initial purchasers has been postponed.

This follows the discovery of a fault in the first production models.

A further four-week delay is now expected. This is in addition to the two-week set back to orders placed within the first week of the launch.

The delay follows Sinclair's strenuous assertion that it would keep to the promised 28-day delivery schedule.

At the time of the launch, Clive Sinclair claimed the first orders would be fulfilled within two weeks.

Sinclair's Bill Nicholls had already acknowledged problems in meeting orders so far placed. However, he emphasised that the "teething troubles" reported in *Popular Computing Weekly* (Vol 1 No 6) arose only in the pre-production models released for review. He said that none of these micros were being sold and that in the production models the problems had been overcome.

Now would be purchasers of the Spectrum have been told by Sinclair Research that they will have to wait up to eight weeks from order to delivery.

Confirming this delay, Bill Nicholls said that the entire first production run, which was to have been dispatched on June 2, had been returned to the Timex factory for further work.

A circuit design problem caused by a clash between the Z80A and the ULA on the data bus is to blame. Apparently, both components were trying to use the data bus at the same time. Sinclair has now cured the problem by inserting a buffer between the Z80A and the ULA.

Bill Nicholls said Sinclair very much regretted the difficulties and claimed that Sinclair Research "had the scale of production to cope and the problem should be rolled-over pretty soon".

Meanwhile no shipments of the Spectrum are being made.

FIASCO completes the transformation

FIASCO (fully interactive algebraic symbolic computing) is a new software package capable of evaluating polynomials, differentials, integrals, trigonometry and even Legendre multipliers. It does so using the normal algebraic notation.

The package, for use with a Pet, is written for 32K of disc store by James Gawlik. It is a version of his program for the ICL 1900 series main-frames. The program uses standard mathematical notation and rational arithmetic, with properly displayed exponents and subscripts, and with correct symbols for summation, integration and factorials.

FIASCO also contains the necessary software to perform all the basic algebraic functions. It costs £80 plus VAT and is available from MacMicro Ltd, Beaufort House, Shore Street, Beauly, Inverness.

Bigger and better port from Thurnall

A 16-line input/output port forms the basis of the new Thurnall range of add-ons for use with ZX81 and Spectrum.

The programmable port, manufactured by Thurnall Engineering, is based on the Z80A PI/O chip. It allows bi-directional data transport in a variety of configurations and includes full handshaking.

Neil McArthur, of Thurnall Engineering, explained that the operation of the port is programmable from the ZX81/80 or Spectrum keyboard. The 16 lines are dedicated, for example in one arrangement as 8-bit input plus 8-bit output.

The unit has been designed for use with the ZX81, but Thurnall is producing an adaptor to enable its use with the Spectrum.

The port plugs into the memory expansion socket on the micro and has two sockets itself. One of these allows connection of a suitable RAM pack and the other is to connect the range of new add-ons designed by Thurnall.

These include a four-output motherboard, a four-channel relay box capable of switching mains voltages (for controlling lighting, heating, etc), joystick, an 8-bit switch unit (to set up individual binary codes), an 8 LED monitor and a driver box (similar to the relay box but not capable of switching mains voltages).

The input/output port is available either in kit-form or fully assembled at £14.95 and £17.95, including VAT.

Thurnall's new range of add-ons for the firm's 16-line port



Club Reports

Thousands bitten by Beeb user-group bug

***David Kelly** talks to the Co-founders of Beebug – the club for BBC owners*

Beebug placed their first advertisement asking for members three months ago. Now they have more than 4000 and new members are joining at the rate of 300 per week!

This dramatic growth has left Beebug's two co-founders, Sheridan Williams and David Graham, elated and somewhat in awe of what they have started.

Both Sheridan and David have been involved with micros since they first appeared in this country.

Sheridan has been working with computers for 15 years and is a lecturer in Computer Science. He is a contributor to the micro computer press, well-known for his help and advice column. David too has been fascinated by micros from the start, and is also a college lecturer and writer.

So, with their large number of contacts and experience of every conceivable micro around, why have the two of them co-founded a user group devoted not to the whole gamut of machines but restricted to only one micro? And why choose the BBC machine?

Sheridan was quick to explain that he didn't see things like that. "Beebug isn't restrictive at all — but it has to concentrate on one machine in order to fulfil its function. It wouldn't be able to be as active and supportive of its members if it didn't adopt that kind of approach." David explained that it wasn't a question of choosing a machine — it was more that the machine chose them!

Sheridan leaned forward and described his initial impression of the machine. "When I first saw it I realised that this was a great machine — at the price and with its features there was nothing comparable.

"When you get a new micro you can tell — you can feel — if it's going to be good or not. With the BBC I immediately felt at home."

At the time both he and David were writing for the same magazine. They met, and discovered that they lived more or less next door to each other. So, in December, 1981, they formed a users group for the then very new BBC micro. After much deliberation the name Beebug was chosen for the group.



Sheridan Williams and David Graham

Beebug was always conceived as an international independent user group dedicated exclusively to the BBC machines.

It would not hold meetings, but would publish a newsletter giving as much information as possible on all aspects of the machine, providing the much needed back up which had hitherto been missing.

The two co-founders placed the first Beebug membership advertisement in March this year and the first issue of the newsletter was sent out at the beginning of May.

David says the response was unbelievable. "In the middle of April we were getting over 200 letters each day. It was just piling up faster than we could cope."

Sheridan gestured the size of the mound of mail and grinned. "There was no way we could cope with reader queries with that many membership applications — that's when we said 'Subscription Agency here we come!' We would have been buried otherwise!"

They now have a membership which represents over one-third of the total number of BBC machines sold by Acorn. The newsletter goes to owners all over the country and there are about 150 overseas members.

"There was a great need for a group such as ours," says Sheridan. "The BBC didn't really know what it was getting into — so where could people turn? They couldn't turn to Acorn either so they turned to us."

With the second issue of Beebug about to appear the two co-founders tried to assess what they had achieved and how they would proceed.

Beebug comes out 10 times per year and the 28 pages of each issue are packed with information of interest to BBC owners — programming hints, reviews, games and longer articles on specific features of the micro.

They are in close and friendly contact with Acorn. As the only major national independent group devoted exclusively to the BBC micro, representing at least one-third of that micro's owners, they have been in a good position to discuss the developments and future of the machine with Acorn, and to raise with them some of the minor faults which have been discovered, such as the packaging which Acorn have now changed, and the problems with the early machines with EPROMS and 0.1 operating systems rather than the current 1.0 ROMs.

Beebug have also been able to arrange discount for their members at various shops and as an independent group they are able to look objectively at the products available for the BBC micro and to suggest those which are worthwhile.

David is very pleased with the way things have gone, but grins. "If I didn't think it was good then I wouldn't want to be involved in it.

"What we are trying to do is to make the technicalities accessible to the beginner and at the same time to make Beebug as packed with programming hints and articles as we possibly can." Sheridan continued: "It's exactly the opposite of that Groucho Marx quote — if I hadn't co-founded Beebug then I would want to join!"

So, what of the future? There will be a cassette-based software library soon, but of their other plans they won't say. "There are only 10 issues of the newsletter each year so in August we shall take a month to just sit and think — we want to keep the level and quality of information as high as possible."

For contributions and editorial enquiries contact Beebug, PO Box 50, St Albans, Herts.

Membership is £4.90 or £8.90 for five or 10 issues. Applications should be sent to Beebug, Dept 1, 374 Wandsworth Road, London SW8.

We want to hear from you!

Whether you are starting a new club, holding a special meeting, or just changing the venue, we want to hear from you.

Write to David Kelly, Club News, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF or call him on 01-930 3271.

COVER STORY

Othello

Can you outwit your computer in this devilish cunning board game?

The game Othello is played on a draughts board, using 64 pieces which are white on one side, and black on the other. The position of the first four pieces on the board is fixed.

From then on, the players can choose where to put their pieces, although they must place their latest piece touching other pieces on the board. Any 'enemy' pieces which lie between the new piece, and another of the player's pieces, are flipped over to show the player's colour.

The game continues until all the squares on the board are covered, or neither player can move. The winner is the player with most pieces of his colour showing.

In the sample printout, which shows our Othello program at the start of the game, the computer is the graphic character from the letter H, while the human is the graphic character from the letter T. You can see that the computer is on two squares, diagonal to each other, and the human is on the other.

First move

In this version of the game, the computer always goes first. The legal moves open to the computer for its first move are 43 — counting down the left-hand side, then across the top — 46, 53, 56, 35 or 64. If the computer moved to 64, then the human's piece at 54 would be changed to a computer piece.

As the game becomes more complex, a number of pieces may change at a single move, as pieces diagonally and orthogonally are changed after each move.

Many people, when writing Othello programs for the computer, get the computer to find all its possible moves, then count up how many pieces are converted for each move, and select the move which converts the most pieces.

Position, however, is more important in the early stages of the game than numbers. Any piece which can be placed at the edge of the board is very strong, because — if it is not in a corner — it can only be converted by a move on either side of it — on the top or the bottom — or above or below it — if it is on one of the sides.

Pieces away from the edge of the board can be converted from any square surrounding the piece. Pieces in the corner are the strongest of all, as a player with a corner piece controls not only his piece — which cannot be converted — but also the rank and file ending on his piece and the diagonal going out from it.

This ZX81 version of the game uses the routine from lines 1220 to 1270 to find the strongest positions. If you want to add an element of randomness to the game, to get it to choose from equally strong positions, add to line 1280, before the THEN GOTO OR(RND(1) greater than 0.3).

You will find this version of the game plays slowly, but fairly well. It certainly puts up a sufficiently good defence to get you thinking and to help you become a better player.

The computer always goes first in this version of the game. You can add a routine between lines 170 and 190 to give the player the option of moving first. If the answer to the question "DO YOU WANT FIRST MOVE?" is yes, then the computer should print out the board — from line 160 — then at line 162 send action to 1390 for the human's move.

The computer goes into fast mode to decide on its move, then back into slow to print the new board. If you want to see the board all the time, then simply delete lines 207 and 1365. Note how the names CHANGE, BOARD and END are assigned to variables — in lines 120 to 140 — to make it clearer when these are used — as in GOSUB BOARD — what they are doing.

The CHANGE routine — from line 4000 — is the routine which actually 'flips' the pieces.

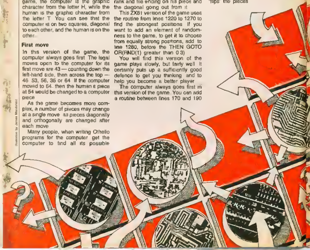


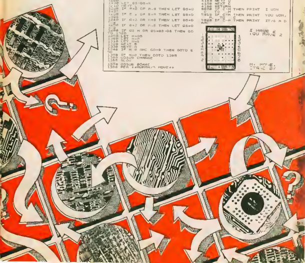
Illustration by James Macdonald

The software-house Mine of Information owns the trademark to the name Othello when it is used in printed matter relating to computer programs. This version of the game was written in Microsoft by Graham Charlton and modified for the ZX81 by ***Tim Hartnell***

```
   1 REM OTHELLO
   2 REM (C) CHARLTON HARTNELL
   3 REM NOTE NAME "OTHELLO" IS
   4 REM COPYRIGHT "MINE OF INFO
RMATION"
   6 LET [illegible]=CODE "[illegible]"
   7 REM LETTER O IN "
   8 LET O=CODE "[illegible]"
  10 DIM A(10,10)
  20 FOR B=2 TO 9
  30 FOR C=2 TO 9
  40 LET A(B,C)=CODE " "
  50 NEXT C
  60 NEXT B
  [illegible] LET A(5,5)=[illegible]
  90 LET A(5,6)=[illegible]
 100 LET A(6,5)=O
 105 LET A(6,6)=O
 110 LET P=0
 120 LET CHANGE=4000
 130 LET BOARD=3000
 140 LET END=5000
 150 REM **PRINT OUT BOARD**
 160 GOSUB BOARD
 165 LET R=PI/PI
 170 LET CO=0
 190 REM **COMPUTER MOVES**
 200 PRINT AT 18,22;"MY MOVE"
;AT [illegible],22;"STAND BY"
 205 FOR Z=1 TO [illegible]
 206 NEXT Z
 207 FAST
 210 LET [illegible]
 220 LET T=[illegible]
 230 LET [illegible]=O
 [illegible] FOR [illegible]=[illegible] TO 9
 [illegible] FOR B=[illegible] TO 9
 [illegible] IF A(A,B)<>CODE " " THEN GOTO 1320
 [illegible] LET QS=0
 [illegible] FOR C=-R TO R
 [illegible] FOR D=-R TO R
1100 LET F=[illegible]
1110 LET [illegible]
1120 LET [illegible]
1130 IF A(F+C,G+D)<>[illegible] THEN GOTO
[illegible]
1140 LET [illegible]
1150 LET F=F+C
[illegible] LET G=G+D
[illegible] GOTO [illegible]
1180 IF A(F+C,G+D)<>T THEN GOTO
1200
1190 LET QS=QS+K
1210 NEXT D
1220 IF A=2 OR A=9 THEN LET QS=0
[illegible]
1230 IF B=2 OR B=9 THEN LET QS=0
[illegible]
1240 IF A=3 OR A=8 THEN LET QS=0
[illegible]
1250 IF B=3 OR A=8 THEN LET QS=0
[illegible]
1260 IF QS<M OR QS=QS-Q8 THEN GO
TO 1320
1290 LET M=QS
1300 LET H=P
1310 LET N=B
1320 NEXT B
1330 NEXT A
1340 IF M=0 AND GO=9 THEN GOTO E
ND
1350 IF M=0 THEN GOTO 1385
1360 GOSUB CHANGE
1365 SLOW
1370 GOSUB BOARD
1380 REM **HUMAN'S MOVE**
1390 PRINT AT 18,20;"YOUR MOVE"
;AT 17,20;"HUMAN"
1400 REM "ENTER 0 TO PASS"
2000 INPUT GO
2010 LET S=[illegible]
2015 REM LETTER O IN 2020
2020 LET T=O
2040 IF GO=0 THEN GOTO 2090
2050 IF GO<11 OR GO>88 THEN GOTO
2000
2060 LET M=INT (GO/10)+R
2070 LET N=GO-10*INT (GO/10)+R
2080 GOSUB CHANGE
2090 GOSUB BOARD
2100 GOTO 200
2110 REM "PRINT BOARD"
3000 PRINT AT 4,7;"[illegible]"
3010 LET L=0
3020 LET M=0
3030 PRINT TAB 7;"[illegible]"
3035 PRINT TAB 7;"[illegible]"
3040 FOR B=2 TO 9
3050 PRINT TAB 6;B-1;"[illegible]"
3060 FOR D=2 TO 9
3070 PRINT CHR$ (A(B,D));
3080 IF A(B,D)=X THEN LET L=L+1
3090 IF A(B,D)=O THEN LET M=M+1
3100 NEXT D
3110 PRINT "[illegible]";B-1
3120 NEXT B
3130 PRINT TAB 7;"[illegible]"
3140 PRINT TAB 7;"[illegible]"
3150 PRINT TAB [illegible]
3160 PRINT
3170 PRINT TAB 4;"I HAVE ";L
3180 PRINT TAB 4;"YOU HAVE ";M
3190 RETURN
4000 FOR C=-R TO R
4010 FOR D=-R TO R
4020 LET F=M
4030 LET G=N
4040 IF A(F+C,G+D)<>[illegible] THEN GOTO
4080
4050 LET F=F+C
4060 LET G=G+D
4070 GOTO 4040
4080 IF A(F+C,G+D)<>T THEN GOTO
4140
4090 LET A(F,G)=T
4100 IF M=F AND N=G THEN GOTO 41
40
4110 LET F=F-C
4120 LET G=G-D
4130 GOTO 4090
4140 NEXT D
4150 NEXT C
4160 RETURN
5000 IF C>H THEN PRINT "I WON ";
C;" TO ";H
5010 IF C<H THEN PRINT "YOU WON,
";H;" TO ";C
5020 IF C=H THEN PRINT "IT'S A D
RAW"
```

```
I HAVE 2
YOU HAVE 2

MY MOVE,
STAND BY
```



Reviews
software

ICL/ZX81 tapes

Super Programs 5, 6 and 8 Available from some W H Smith branches or direct from Sinclair Research, Freepost Camberley, Surrey GU15 3BR Price £4 95 each

If your local W H Smith has a ZX81 counter you will have noticed the rows of brightly coloured software tapes somewhere nearby The range is being extended all the time, but the original ICL tapes can be recognised by their bright orange and red cases, together with the rather more sombre brown and white-striped cases of the Educational Software

There are five tapes of programs for the unexpanded, 1K machine and some 14 tapes of 16K programs, including three games tapes and 11 educational/domestic tapes

Tape number 5 contains five games — Martian Knock Out, Graffiti, Find The Mate, Labyrinth and Drop A Brick — and a Utility program for converting between English and Continental dress sizes

In Martian Knock-Out, the player as the last defender of a beleagured Earth has 15 rockets left with which to annihilate the Martian hoards The Martians look suspiciously like several pixels sitting stationary at one side of the screen while the player lobs deadly inverse characters at them

This program takes up almost two of the available 16K of RAM and is quite typical of the poor graphics and lack of imagination of — almost all — the rest of the games on offer Poor graphics might be acceptable, if some of the residue memory had been used for clever response but unfortunately these are also missing with the end of the game being signalled by a 9-600ish report

Graffiti is a drawing program, again using only 2K Using the cursor keys characters can be drawn across the screen, making some kind of picture There is no SAVE routine — why not there is lots of memory left? So the program cannot be of any practical use This is a pity as there is also a great routine for printing ultra-large letters

Find the Mate is a pretty standard, and odring pairs program Labyrinth shows a plan view of a classical maze There is treasure at the centre which the player has to obtain whilst avoiding the guards who move about the Maze as the player moves If you meet one of these guards the statement captured and killed is displayed and the program stops Subtle hey?

Drop a Brick is about the poorest *Breakout* I have even seen It is extremely slow being written in Basic only and the ball



wanders about in a very drunken state

Continental is a utility program to convert from English to continental dress sizes and vice-versa This is fairly useful and, along the way, quite informative For instance did you know that continentals measure their bras *under* the bust, while we English measure *across* the bust?

Tape number 6 contains six games of which five are of even greater mediocrity than tape number 5 Galactic Invasion is exactly like Martian Knock out but reverses left to right Create is Graffiti in inverse Daylight Robbery is very similar to Labyrinth while Golf consists of moving an "O on to an H Solitaire is a very pedestrian 3K version of the ancient game

Only Journey into Danger creates a glimmer of interest This is a 6K game and creates a maze through which the player has to move, from entrance to exit, picking up treasure and meeting monsters on the way

Upon meeting a monster, the player is give the odds for a win and then asked to choose between fighting and running Points are scored for killing monsters and finding treasure The current score is continuously displayed along with several mildly amusing comments such as 'Tea break — time penalty 45 This is probably the best game so far on either tape

Tape number 8 contains just one game program, Star Trail, a 14K version of the old mainframe Startrek At last the author — who incidentally is not identified on any of these ICL tapes — has stretched his imagination to give some value for money The mechanics of the game are fairly standard If you like playing this old favourite as I do you will not be surprised to start with However there are some unique details The photon torpedoes for instance track a nice graphic trail across the sector and there is a very satisfying galaxy shaking explosion when a Klingon is destroyed

Another detail which I am sure is unique is this program and which *almost* makes this tape worth the price of £4 95 is the docking procedure at a Star Base The player has a lovely little game within a game in order to get the Enterprise docked When he finally succeeds and this is extremely hard to do, there is a very imaginative countdown and blastoff

Summary

These tapes are on the whole very disappointing The avilable memory is certainly not used to capacity and the lack of imagination in the use of graphics and responses is staggering

Keeping in mind the other tapes available nowadays at a similar price — and software from independent houses is getting more and more competitive — tapes 5 and 6 cannot really be recommended Tape 8, containing STAR TRAIL is however, very interesting It is probably worth £4 95, when compared with other, similarly-priced programs

The best thing ICL could do now the initial flush of ZX-mania is over would be to combine the best of these programs — Star Trail Journey into Danger and the conversion program — on to one tape They might than have a viable product **TB**

Reviews
hardware

Byg-byte

Available from CAPS Ltd, 28 The Spain, Petersfield Hants GU32 3LA Price £34 95

This firm was one of the first contenders in the battle to beat Sinclair at producing a cheaper 16K RAM pack for the ZX80 s and ZX81 s

The pack comes in a large black plastic box and a grey edge connector Once fitted it has the same disadvantage that most 16K RAM Packs have — there is no way of connecting up anything else to the ZX81 as the entire edge connector is covered up The only solution to this is to go out and buy a motherboard

This does not however stop the use of Sinclairs Printer as it fits between the RAM Pack and the ZX81

Inside the box is the usual array of eight 4116 — 16K×1 bit — chips and decoding circuitry This takes up about a quarter of the box s thickness the rest being empty The printed circuit board also provides a power-on indicator in the form of a miniature red LED which glows when power is applied to the RAM Pack

The case is only held together by four large screws so it could be used to mount another board inside taking the connections to the ZX81 off the edge connector The edge connector should be slightly longer as it suffers from the same problem the Sinclair 16K RAM Packs used to have

It is against the case of the ZX81 and does not allow full contact between the ZX81 and the edge connector The two inch thick box does stabilies the RAM Pack and stops the infamous Sinclair wobble

The price of £34 95 was cheap at the time it was introduced but now that Sinclair has reduced the cost of his own 16K RAM Pack from £49 95 to £29 95 firms like CAPS will either have to reduce their prices even more or go out of business

The ZX user is famous for his discerning taste in low cost and value for money choice He/she has proved to other manufacturers that they can no longer get away with huge profits with the excuse that their products cost a great deal to make and maintain

The ZX manufacturer has shown that he can match Sinclairs computers with other products in the same price range I hope that CAPand others will now feel encouraged to take up the baton on behalf of users of computers in general and supply other machines with the same quality goods

Summary
An improvement on the original Sinclair RAM Pack at £49 95 with all its problems It has now been superseded by Sinclair and others dropping their prices to match the falling cost of producing RAM IC s ahd other components It will only need to change it s price to stay in the market **SA**


The innards of CAPS 16K RAM pack

Fuller keyboard

The ZX Computer Centre Sweeting Street, Liverpool 2, England Tel 051-236 6109

The cased Fuller system can come with a wide variety of boards to supplement the ZX80 or ZX81 system, the difference being that the whole system can all be packed in the same case

The Fuller completed system consists of 56K of memory, internal power supply motherboard consisting of four sockets and a keyboard with two extra shift keys All of these can be bought individually, as your finances allow

The most remarkable thing about the system is the 16K RAM board This uses the industrial standard 4116 RAM chips just like the Sinclair 16K RAM pack and it costs £35 95

It can also be converted to take the new 64K RAM chips (by the use of a few metal straps) on the same board This means of course that you do not have to throw away your 16K when you require more memory just pay £45 for the new chips and the instructions to do the changeover

The full 42 key keyboard (they also do a plain 40 key version at £19 95 without case and as a kit) is housed in a low black box approximately three inches high This will house a ZX81 without having to do any soldering (the ZX80 version requires solder connections to the keyboard as there are no sockets)

The rest of the system then just clips together via the edge connectors provided

There are holes for the edge connector in the case whether you wish to have a motherboard or not, so Sinclair's RAM pack or printer can also be used If you have a motherboard already this can fit on here

The whole Fuller system is well designed ahd robust enough to stand up to most things **SA**

Intro. to Basic

By M R Eagles
Bell + Hyman, 147 pages, paperback
Price £3 50

This second edition of a book published in 1976 is not quite the first one to attempt to teach the beginner Basic

Most books perforce are terminal-based That is they describe the Basic of the Open University and Southampton — dialects very good for work with main frames and fairly close to the Dartmouth original

However that original dates back millenia it seems So it is good that Eagles unusually tries a little to recognise the existence of micros and graphics His concepts are applied to some extent to the Pet as well as to terminal work

Another unusual aspect of this book is the exercises for the reader Of course most beginning Basic books have some such content In this case however many of the tasks are not run-of the mill Almost a third of the book is given over to discussing possible answers and giving further programming ideas

I hesitate to recommend the book, despite its unusual features because I suspect that most readers of *Popular Computing Weekly* are users of modern low-cost micros These come with fairly adequate machine-specific manuals Perhaps most readers don t even know that this is unusual Acorn and Sinclair were just about the first to recognise that purchasers may have no knowledge of programming and BASIC

However if you are looking for a general account of Basic whatever the reason, this one is better than most

Summary
The need for such books is rapidly decreasing This is a fairly good example of the genre

Open Forum

Open Forum is for you to publish your programs and ideas
It is important that your programs are bug free before you send them in We cannot test all of them
Contributions should be sent to Popular Computing Weekly, Hobhouse Court,
19 Whitcomb Street, London WC2H 7HF

How to contribute

Each week the editor goes through all the programs that you send to Open Forum in order to find the Program of the Week.

The author of that program will qualify for DOUBLE the usual fee we pay for published programs. (The usual fee is £10.)

Presentation hints

Programs which are most likely to be considered for the Program of the Week will be computer printed and accompanied by a cassette.

The program will be well documented, the documentation being typed with a double spacing between each line.

The documentation should start with a general description of the program and then give some detail of how the program has been constructed and of its special features.

Listings taken from a ZX Printer should be cut into convenient lengths and carefully stuck down on to white paper, avoiding any creasing.

Please enclose a stamped, self-addressed envelope.

Rocket blaster

on Vic 20

The program draws a city on the screen in the middle are two fuel cells protected by a pyramid. The idea is to place a bomb in front of the incoming enemy missiles to stop them blowing up your fuel cells. Should the fuel cells be hit by a missile then you will lose the game.

Controls are included in the listing of the program.

Program notes

Lines 5-9 set up the screen
Lines 190-198 checks to see if the fuel cells have been hit.
Lines 220-280 are the controls
Lines 1000-1060 contain the subroutine for blowing up the missiles
Lines 2500-2570 give the explosion and sound if the fuel cells are hit.
Lines 3000-3110 give the instructions.
To speed up or slow the rate of descent of the missiles alter the first value for TIS in line 180

Rocket blaster
by Philip Rollason

```
[illegible]
```

turn to next page

Pontoon

on ZX81

The program requires 16K memory. On loading it provides the necessary prompts for input Stake Buy Twist or Stick. The only slow part is the shuffling of the pack which takes about 10 seconds, the remaining pauses are by way of loop and could be adjusted for length

The player's hand is shown on the lower half of the screen until he/she "sticks" when it is scrolled to the upper part. The dealers hand is then built up on the lower half until the dealer (ZX81) sticks. The screen is then cleared for the next hand

The stake for the current hand is continuously updated as are the remaining funds after each hand

Rocket Blaster
continued

```
[illegible]
```

Pontoon
by D K Allen

```
   1 GOTO 2000
   2 DIM B$(5)
   3 LET MM=0
   4 LET DD=0
   5 LET O=0
   6 LET F=2
   7 LET V=0
  10 LET P=0
  11 LET M=0
  12 LET MM=0
  13 LET AA=0
  14 RETURN
  15 GOSUB 3
  17 LET TT=0
  18 LET T=0
  19 DIM A(53)
  20 FOR B=1 TO 52
  30 LET A(B)=B
  40 NEXT B
  41 REM SHUFFLE
  44 PRINT
  45 PRINT "HAND ON I AM SHUFFLI
NG..."
  50 FOR B=1 TO 52
  60 LET C=INT (RND*52)+1
  70 LET A(53)=A(B)
  80 LET A(B)=A(C)
  90 LET A(C)=A(53)
 100 NEXT B
 105 CLS
 134 LET B=1
 135 PRINT AT 21,1,

 136 IF B=53 THEN LET B=1
 140 IF A(B)<14 THEN GOTO 200
 150 IF A(B)>13 AND A(B)<27 THEN
GOTO 300
 160 IF A(B)>26 AND A(B)<40 THEN
GOTO 400
 170 IF A(B)>39 THEN GOTO 500
 200 LET A$="D"
 205 LET D=A(B)
 210 GOTO 550
 300 LET A$="C"
 310 LET D=A(B)-13
 320 GOTO 550
 400 LET A$="H"
 410 LET D=A(B)-26
 420 GOTO 550
 500 LET A$="S"
 510 LET D=A(B)-39
 597 REM [illegible]
 599 LET E=15
 600 PRINT AT E,F-1,"[graphics]"
 601 FOR G=1 TO 5
 602 PRINT AT E+G,F-1,"[graphics]"
 603 NEXT G
 604 PRINT AT E+6,F-1,"[graphics]"
 605 FOR R=1 TO 25
 606 NEXT R
 610 IF D=1 THEN PRINT AT E+1,F
,"    ",AT E+2,F,"    ",AT E+3,F,"
*  ",AT E+4,F,"    ",AT E+5,F

 615 IF D=2 THEN PRINT AT E+1,F,
"  ",AT E+2,F,"  *  ",AT E+3,F,"
 ",AT E+4,F,"  * ",AT E+5,F,

 620 IF D=3 THEN PRINT AT E+1,F,
"  ",AT E+2,F,"  * ",AT E+3,F,"
*  ",AT E+4,F,"  *  ",AT E+5,F,"

 625 IF D=4 THEN PRINT AT E+1,F,
"  ",AT E+2,F," * * ",AT E+3,F,"
 ",AT E+4,F," * * ",AT E+5,F,

 630 IF D=5 THEN PRINT AT E+1,F,
"  ",AT E+2,F," * * ",AT E+3,F,"
*  ",AT E+4,F," * * ",AT E+5,F,

 635 IF D=6 THEN PRINT AT E+1,F,
"  ",AT E+2,F," * *",AT E+3,F,"*
* ",AT E+4,F," * *",AT E+5,F,

 640 IF D=7 THEN PRINT AT E+1,F,
"  ",AT E+2,F," * * ",AT E+3,F," *
** ",AT E+4,F," * * ",AT E+5,F,

 645 IF D=8 THEN PRINT AT E+1,F,
"  ",AT E+2,F," * * ",AT E+3,F,"*
*",AT E+4,F," * *",AT E+5,F," * *

 650 IF D=9 THEN PRINT AT E+1,F,
"  ",AT E+2,F," *** ",AT E+3,F,"*
**",AT E+4,F," ***",AT E+5,F.

 655 IF D=10 THEN PRINT AT E+1,F
,"* * ",AT E+2,F," * *",AT E+3,F,"
* * ",AT E+4,F," * * ",AT E+5,F," *
*"
 660 IF D=11 THEN PRINT AT E+1,F
,"  ",AT E+2,F,"    ",AT E+3,F,"
[graphics] ",AT E+4,F,"    ",AT E+5,F,

 665 IF D=12 THEN PRINT AT E+1,F
,"  ",AT E+2,F"    ",AT E+3,F,"
[graphics] ",AT E+4,F,"  ",AT E+5,F,

 670 IF D=13 THEN PRINT AT E+1,F
,"  ",AT E+2,F,"    ",AT E+3,F,"
[graphics] ",AT E+4,F,"    ",AT E+5,F,"

 675 IF A$(1)="C" THEN PRINT AT
E,F-1,"[graphics]",AT E+6,F-1,"[graphics]"
 680 IF A$(1)="D" THEN PRINT AT
E,F-1,"[graphics]",AT E+6,F-1,"[graphics]"
 685 IF A$(1)="S" THEN PRINT AT
E,F-1,"[graphics]",AT E+6,F-1,"[graphics]"
 690 IF A$(1)="H" THEN PRINT AT
E,F-1,"[graphics]",AT E+6,F-1,"[graphics]"
 691 IF D>10 THEN LET D=10
 693 IF D=1 THEN LET DD=10
 694 LET F=F+6
 700 PRINT AT 11,1,

 710 LET M=M+D
 715 IF DD=10 THEN LET MM=M+DD
 740 PRINT AT 11,1,"SCORE-",M,"

 745 IF MM<>0 THEN PRINT AT 11,1
,"SCORE-",M," OR ",MM
 750 IF V=0 AND O=0 THEN PRINT A
```

Open Forum

```
T 21,1,"STAKE?"

 751 IF V=0 AND Q=0 THEN INPUT Z
 755 IF Z>Y THEN PRINT AT 21,1,"
YOU ONLY HAVE £",Y
 758 IF NOT Z>Y THEN GOTO 772
 760 FOR R=1 TO 75
 765 NEXT R
 770 IF Z>Y THEN GOTO 750
 772 LET G=G+1
 773 LET V=V+1
 774 IF V=1 AND Q=0 THEN PRINT A
T 11,22,"STAKE £",Z
 775 IF V=1 AND Q=0 THEN LET ZZ=
Z
 777 LET VV=Z
 779 IF V=1 THEN GOTO 135
 780 GOTO 900
 790 PRINT AT 11,1,"

 800 GOTO 135
 900 REM INSTRUCTIONS
 901 IF Q THEN GOTO 1100
 902 IF MM=21 AND V=2 THEN PRINT
 AT 11,13,"PONTOON"
 904 IF MM=21 AND V=2 THEN GOTO
1000
 905 IF M<12 AND V<>4 THEN PRINT
 AT 21,1,"BUY ANOTHER?-INPUT ""B
"."
 906 IF M<12 AND V=4 THEN PRINT
AT 21,1,"TWIST?"
 910 IF M>=12 AND M<17 THEN PRIN
T AT 21,1,"BUY,TWIST OR STICK?"

 913 IF M<=21 AND V=5 THEN LET A
A=1
 914 IF MM=21 AND V=3 THEN LET A
=1
 915 IF M>=17 AND M<=21 THEN PRI
NT AT 21,1,"TWIST OR STICK?"

 916 IF M<=21 AND V=5 THEN GOTO
1000
 917 IF M>21 THEN PRINT AT 11,16
,"BUST"
 918 IF M>21 THEN LET Y=Y-ZZ
 919 IF M>21 THEN GOTO 1200
 920 INPUT B$
 921 IF B$(1)="S" THEN GOTO 1000
 922 IF B$(1)="T" THEN GOTO 950
 923 IF B$(1)="B" THEN GOTO 925
 924 GOTO 900
 925 PRINT AT 21,1,"INPUT STAKE
"
 926 INPUT Z
 927 IF Z+ZZ<=Y THEN GOTO 935
 928 PRINT AT 21,1,"YOU ONLY HAV
E £",Y-ZZ," LEFT"
 929 IF Z>VV THEN PRINT AT 21,1,"
MAXIMUM STAKE £",VV,

 930 FOR R=1 TO 30
 931 NEXT R
 932 IF Z>VV THEN GOTO 920
 933 LET Z=0
 934 GOTO 900
 935 IF Z>VV THEN PRINT AT 21,1,"
MAX STAKE £",VV,
 936 FOR R=1 TO 30
 937 NEXT R
 938 IF Z>VV THEN GOTO 926
 939 LET ZZ=ZZ+Z
 940 PRINT AT 11,22,"STAKE £",ZZ
 955 GOTO 135
 990 FOR R=1 TO 50
 998 NEXT R
1000 LET T=M
1001 IF MM>M AND MM<=21 THEN LET
 T=MM
1008 REM BANKER
1009 FOR U=1 TO 10
1010 SCROLL
1020 NEXT U
1030 PRINT AT 11,1,"BANKERS TURN

1031 LET V=0
1032 LET D=0
1034 LET DD=0
1035 LET F=2
1036 LET M=0
1037 LET MM=0
1040 LET Q=1
1050 GOTO 135
1100 REM SCORE
1101 IF MM=21 AND V=2 THEN GOTO
1140
1103 IF V=1 THEN GOTO 135
1104 IF M<=16 AND MM<>19 AND MM<
>20 AND MM<>21 THEN GOTO 135
1109 IF V=5 THEN GOTO 1140
1110 LET U=INT (RND*4)
1120 IF U=1 AND M>16 AND M<19 TH
EN GOTO 135
1130 IF M>=17 OR M<=20 THEN GOTO
 1140
1132 IF M>21 THEN PRINT AT 11,15
,"YOU WIN"
1142 LET TT=M
1145 IF MM>M AND MM<=21 THEN LET
 TT=MM
1146 IF P=1 THEN LET TT=TT-10
1147 IF AA=1 AND V>2 THEN LET T=
TT+10
1148 IF V=5 AND TT<T THEN LET T=
TT-10
1150 IF T>TT OR TT>21 THEN PRINT
 AT 11,16,"YOU WIN"
1151 IF T>TT OR TT>21 THEN LET Y
=Y+ZZ
1160 IF TT>=T AND TT<=21 THEN PR
INT AT 11,16,"I WIN"
1161 IF TT>=T AND TT<=21 THEN LE
T Y=Y-ZZ
1170 LET T=0
1180 LET TT=0
1200 FOR R=1 TO 75
1201 NEXT R
1205 CLS
1210 IF Y<=0 THEN PRINT AT 10,2,"
YOU HAVE NO STAKE LEFT AND I DO
 NOT ACCEPT CREDIT CARDS"
1211 IF Y<=0 THEN STOP
1212 PRINT "NEXT HAND COMING UP"
1213 PRINT
1214 PRINT "YOU NOW HAVE £",Y
1215 FOR R=1 TO 100
1216 NEXT R
1220 GOSUB 3
1299 CLS
1300 GOTO 135
1935 STOP
1999 SAVE "[illegible]"
2000 PRINT AT 7,11,"PONTOON"
2015 FOR R=1 TO 100
2020 NEXT R
2030 CLS
2040 PRINT "HOW MUCH MONEY HAVE
YOU BROUGHT?(MAXIMUM £100)"
2050 PRINT
2060 INPUT Y
2065 IF Y>100 THEN GOTO 2060
2070 PRINT "YOUR STAKE IS £",Y
2090 GOTO 15
```

Mock monitor

on Genie

It is often quite useful to be able to speed up a Basic program by incorporating a machine language routine but published assembled programs usually expect the source code to be fed into a monitor or assembler to produce a tape of the object code which is always a series of hexadecimal numbers made up of data and instructions and found on the extreme left of the listing

Unfortunately, hexadecimal code cannot be fed directly into Basic programs but must be poked into RAM in decimal form The following Mock Monitor program will produce demical equivalents of the object code which can be poked into RAM and called from the Basic program by the USR function

The Videogenie memory prompt (READY?) should be set to 32510 on initialisation and the decimal code will be poked into RAM from 7F00H (32512) It will also be printed out both on the VDU and by the lineprinter if available (see line 446)

A display of addresses and hexcodes is printed out on the VDU as it is being read into memory from the haadata statements in line 500 The code listed here merely demonstrates that you can have a screenful of dollars without getting any richer, but

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your own object code from the program you wish to use will of course be typed in at line 500

The OD error message generated by the jump out of the loop at line 330 should be answered with "RUN 380" to complete the program. Typing "NEW" will clear out the Mock Monitor ready for your Basic

```
5 CLS  REM SET MEMOR - [illegible]
10 REM MOCK MONITOR - [illegible] T BASIC
20 PRINTA0  HEX M.C TO [illegible]
30 PRINTA64  ON TO ERASE [illegible]
40 DIM H$(15)
50 DATA 0 1 2 3 4 [illegible] E F
60 FOR I=0 TO 15 READ H$ I [illegible]
70 PRINTA194  HEXSTART ADDR[illegible]
80 GOSUB 310
90 A= 16026  PRINTA214 A$
95 GOSUB 310
100 A=A+X*256  PRINTA215 A$
120 GOSUB 310
130 H=H+X*16  PRINTA216 H$
140 GOSUB 310
150 H=A+X  PRINTA217 A$
160 REM HEXSTART NOW DECIMA
170 PRINTA256  DEC ADDRESS  H
180 PRINTA290  DATA
190 GOSUB 310
200 D=X*16 PRINTA280 A$
210 GOSUB 310
220 D=D+  PRINTA299 A$
230 FOR K=1 TO 200  NEXT K
240 REM NEW DATA TO RAM
245 REM 32512 SYSTEM CALL [illegible]
250 POKE A D
260 PRINTA[illegible]
270 A=A+1
280 [illegible] 170
300 REM [illegible] ROUTINE ENDLE[illegible]
305 REM [illegible] IGNORE ERROR MESSAGE
310 [illegible] -$
320 FOR I=0 TO 15
330 IF H$(I)=A$ THEN GOTO 360
340 NEXT I
350 GOTO 310
360 X=I
370 RETURN
380 INPUT HOW MANY BYTES  N
390 Z=INP(253)  IF Z>54 THEN GOTO 460
400 FOR Y=32512 TO 32512+N
410 X=PEEK(
420 PRINT X
430 LPRINT X
440 NEXT Y
445 REM DELETE 390 & 430 IF NO PRINTER
460 PRINT PRINTER OFF LINE - RESET  STOP
470 DATA 7 F 0 0
480 REM INPUT HEXDATA ONE DIGIT
490 REM AT A TIME FROM LINE 500
500 DATA 2 1 0 0 3 C 0 1 0 0 0 4 1 6 2 4 [illegible] 2 3 0 0 7 [illegible]
0 0 1 0 0 0 0 0 3 7 0 0 1 1 2 4 6 4 0
510 REM 25 BYTES FOR LINE 390
```

REMloader

on ZX81

Machine code runs easily on the ZX81 and more and more programs are making use of its extra speed and compactness. The best place to put it is usually in a REM statement at the beginning of Basic, where it is safe from being over written and can easily be saved and loaded. But typing all those long REMs and trying not to lose count is very hard on the fingers and on the eyes.

Now you need do it only once more and then never again. The following routine which occupies only 96 bytes will give you in a flash a REM of any length you wish. There is no upper limit so long as you have enough RAM.

First type in at line 1 a REM consisting of 96 full stops (or whatever character you fancy). Then enter the Basic part of the program exactly as given. Be sure to leave line 2 free — that is where your REM will appear. The solitary REM at line 3 is a safety device and should *never* be deleted even after the whole program is finished and running. Its purpose is to prevent the display from going into an endless loop if the REM at line 2 is longer than the screen can hold.

At line 15 enter your favourite machine-code loader and at once use it to poke the following codes into the 96 bytes in line 1. Now SAVE the whole lot. You now have a very useful and time-saving routine.

REMloader
by Dr LFW Rowe

```
16514   00 00 CD 20 0F 01 05 00
16522   2A 82 40 E5 09 44 4D 2A
16530   29 40 09 22 29 40 21 0C
16538   40 3E 09 6E 23 56 D5 EB
16546   09 EB 72 2B 73 23 23 3D
16554   20 03 D1 18 EE E1 E5 01
16562   E2 40 A7 ED 42 44 4D E1
16570   ED 60 21 E3 40 36 00 23
16578   36 02 23 C1 03 03 71 23
16586   70 23 36 EA 00 05 23 11
16594   01 00 EB 19 E6 36 16 E0
16602   00 36 76 34 CD 20 0F C9
```

```
 1 REM ................................
........................................
........................................
.........
 3 REM
 4 PRINT "LENGTH OF REM ",
 5 INPUT N
 6 PRINT N
 7 POKE 16514,N-256*INT (N/256
)
 8 POKE 16515,INT (N/256)
 9 RAND USR 16516
10 PRINT "DELETE LINE 1. THEN
GOTO 15"
12 STOP
```

Open Forum

Quote unquote

on ZX81

This is a game for two or more players reminiscent of Hangman

Player A types in a well-known quote or proverb and all the letters in it are changed to stars as well as the quote or proverb being put within quotes For instance VENI VIDI VICI would come out as

"**** **** ****

Player B then types in what he thinks the proverb is, or N/L if he does not know If the guess is wrong then a random letter is added The example might become this

***I *I*I *I*I

This carries on until the quote is correctly guessed The number of tries is then shown The object is to guess the quote in the least number of guesses The program will run on a 1K ZX81

Arabic writing

on ZX81

This program allows me to write in Arabic It is very similar to ones commonly seen in computer journals They do have a snag in that you cannot save an unfinished picture I overcame this problem by using the INKEY$ function

The program does not crash when you hit the edge of the screen

I have also included a border routine which gives the finished picture a better effect

Side Shoot

on Vic 20

The idea is to shoot down enemy space ships before they pass you You are on the right hand side of the screen and can move up or down The aliens start on the left side of the screen and move towards the right

There are two types of alien craft both created from user defined graphics One is green the other yellow The green craft is worth 10 points and the yellow saucer is worth 50 points and moves twice as fast as the first

When 300 points are reached both spacecraft move at the same quick speed

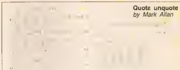
The player s space ship is made up of two squares and is again user-defined but is displayed in the multi colour format

The game ends when five aliens have managed to pass you

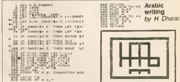
Variables used

A1 Position of green space craft

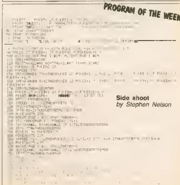
turn to next page



Quote unquote
by Mark Allan



Arabic writing
by H Dharsi



Side shoot
by Stephen Nelson

from previous page

A2– Position of yellow flying saucer
J1&J2– Used to determine how far right the two spacecraft are
B&B+1– Position of players space-ship
SC– Score
TS– High score
LI– Lives left

```
[illegible]
1000 PRINT [illegible]
1010 PRINT [illegible]
[illegible]
1030 PRINT [illegible] FACE [illegible]
1040 PRINT [illegible]
1050 PRINT [illegible]TO START PRESS [illegible]
1060 LET A$ [illegible] THEN1060
1070 GOTO[illegible]
1080 END
1100 FOR[illegible] POKE [illegible] NEXT
1110 POKE[illegible] 255
1120 FOR[illegible] READ [illegible] POKE [illegible] NEXT
1130 RETURN
1140 DATA8 0 0 5 [illegible]
1150 DATA102 255 153 [illegible] 255 231 [illegible] 0 0 0 [illegible]
1200 PRINTPEEK [illegible] GOTO1200
```

Digger

on ZX81

The screen is drawn with eleven random pits dotted around. Your digger always starts from the centre. Then a monster appears — its position being random.

As soon as it appears it starts chasing after you. You move with the cursor keys and dig with the J key. You always dig a space to your right.

If you happen to fall into one of these pits you lose one of your five lives. If a monster falls down a pit you gain a point and the pit is filled.

Every now and again a G appears. This is a gold mine. If you land on it you gain five points.

You will need nerve and nimble fingers to beat the monster. Good luck.

Digger
by Graham Plowman

```
  1 CLS
 10 LET L=5
 20 FOR Q=0 TO 21
 30 PRINT "█"
 40 NEXT Q
 50 PRINT AT 0,0,"█"
 60 PRINT AT 21,0,"█"
 70 LET S=0
 80 DIM Q(31,21)
 90 FOR Q=0 TO 10
100 LET AY=INT (RND*30)+1
110 LET AX=INT (RND*20)+1
120 PRINT AT AX,AY," "
130 LET Q(AY,AX)=1
140 NEXT Q
150 LET A=10
151 LET H=INT (RND*20)+1
152 LET K=INT (RND*30)+1
170 LET B=15
171 LET Q(B,A)=0
175 PRINT AT 0,10,"█",L
180 LET X=INT (RND*20)+1
190 LET Y=INT (RND*30)+1
200 PRINT AT A,B,"█"
201 IF A=H AND B=K THEN GOTO 70
0
210 LET AD=A
220 LET BD=B
230 PRINT AT X,Y,"█"
231 PRINT AT 10,15,"█"
240 LET XD=X
250 LET YD=Y
260 LET A=A+(INKEY$="6")-(INKEY
$="7")
270 LET B=B+(INKEY$="8")-(INKEY
$="5")
280 IF X>A THEN LET X=X-1
290 IF X<A THEN LET X=X+1
300 IF Y>B THEN LET Y=Y-1
310 IF Y<B THEN LET Y=Y+1
315 IF INKEY$="J" THEN GOSUB 50
0
316 LET E=INT (RND*10)
317 IF E=5 THEN PRINT AT H,K,"█
"
318 IF E=7 THEN PRINT AT H,K,"█
"
320 PRINT AT AD,BD,"█"
330 PRINT AT XD,YD,"█"
340 IF Q(Y,X)=1 THEN GOTO 600
350 IF Q(B,A)=1 THEN GOTO 400
360 IF X=A AND B=Y THEN GOTO 40
0
390 GOTO 200
400 PRINT AT A,B,"█"
401 PRINT AT H,K,"█"
410 LET L=L-1
430 FOR D=0 TO 100
440 NEXT D
441 PRINT AT A,B," "
442 LET Q(B,A)=1
450 IF L>0 THEN GOTO 150
455 PRINT AT 0,10,"█"
460 IF INKEY$="R" THEN RUN
470 GOTO 460
505 PRINT AT A,B+1," "
510 LET Q(B+1,A)=1
520 RETURN
600 PRINT AT X,Y,"X"
610 FOR U=0 TO 20
620 NEXT U
629 PRINT AT X,Y," "
630 LET Q(Y,X)=0
631 FOR J=0 TO 10
632 NEXT J
633 PRINT AT X,Y,"█"
640 LET S=S+1
650 PRINT AT 0,0,"█";S
660 FOR U=0 TO 10
670 NEXT U
680 GOTO 150
700 LET S=S+5
710 PRINT AT 0,20,"█"
720 FOR T=0 TO 200
730 NEXT T
740 PRINT AT H,K,"█"
750 LET H=INT (RND*20)+1
760 LET K=INT (RND*30)+1
770 GOTO 200
```

Fruit machine

on BBC Micro

The data in line 30 contains the Asci codes of the characters which can be displayed on the machine. In line 50 the VDU23,8202,0,0,0 turns the cursor off.

Line 110 contains the winning combinations and their values.

Every time the symbol ' appears it should be replaced by £.

PROCMD draws the fruit machine.

After displaying the winning combinations at the start and after revealing your fate the computer will wait for you to press a key before continuing.

Random choice

on Vic 20

This game of chance takes the form of the old party game Stone, Scissors, Paper.

In this adaptation, the operator keys in which object he wishes to play with. The computer randomly selects an object (lines 110 to 140), compares it with the operator's (lines 150 to 350) and prints the result.

Lines 360 to 510 are to keep the score which is obtained by typing in 3 (line 80).

Line 8 is to clear the screen.

The game should give even odds for the computer and the operator. Experience shows, however, that the computer seems to have the edge.

Fruit Machine
by Alan Wood

```
10DIMA$(7),P$(8),P(8),L$(3)
20FORZ=1TO7:READC:A$(Z)=CHR$C:NEXTZ
30DATA54,123,42,35,9,4,88
40MODE5
50VDU19,1,6,0,0,0,19,3,5,0,0,0,0,23,8202,0,0,0,0
60CLS:COLOUR2
70PRINT" FRUIT MACHINE"
80PRINT'"------- -------"
90PE=TIME)10
100FORZ=1TO8:READP$(Z),P(Z):NEXTZ
110DATA ,20,$$$,10,/// ,10,###,10,   ,10,***,8,+++,5,XXX,5
120PRINT
130FORZ=1TO8:PRINTP$(Z);" wins ";P(Z):NEXTZ
140PRINT"--- wins 2"  "--- wins 2"
150K$=GET$
160PROCMD
170PROCCB
180PROCAG
190GOTO170
200DEFPROCMD
210GCOL0,1
220MOVE800,0:MOVE850,800:PLOT85,850,600:MOVE850,0:PLOT85,800,0
230MOVE1200,0:MOVE1200,800:PLOT85,1250,600:MOVE1250,0:PLOT85,1200,0
240MOVE850,0:PLOT85,850,100:MOVE1200,100:PLOT85,1200,0
250MOVE1200,600:MOVE850,600:PLOT85,850,550:MOVE1200,500:PLOT85,1200,600
260MOVE1200,450:MOVE850,450:PLOT85,850,400:MOVE1200,400:PLOT85,1200,450
270VDU5:MOVE870,350:PRINT"MONEY":MOVE870,290:PRINT"MAKER"
280MOVE870,200:PRINT"  "
290VDU4:ENDPROC
300DEFPROCCB
310PROCRN
320FORZ=1TO3:L$(Z)=A$(RND(7)):NEXTZ
330PRINTTAB(14,16);L$(1);L$(2);L$(3);
340PROCCK
350ENDPROC
360DEFPROCRN
370COLOUR1
380FORX=1TO(10+RND(10)):PRINTTAB(14,16);A$(RND(7));A$(RND(7));A$(RND(7));:SOUND1,-15,RND(255),1:FORA=1TO100:NEXTA:SOUND2,-15,RND(255),2:SOUND3,-15,RND(255),2:NEXTX
390ENDPROC
400DEFPROCCK
410W=0
420W$=L$(1)+L$(2)+L$(3)
430FORX=1TO8:IFW$=P$(X):W=P(X):NEXTX ELSE NEXTX
440IFW=0ANDL$(1)="  "ORL$(1)="#":W=2
450IFW>0COLOUR3:PRINTTAB(15,5);"You";TAB(15,6);"win";TAB(15,7);W;" £ ":ENDPROC
460COLOUR3:PRINTTAB(15,5);"You";TAB(15,6);"lose.":ENDPROC
470DEFPROCAG
480VDU5
490*FX15,0
500F$=GET$
510VDU4
520PRINTTAB(15,5)"   ";TAB(15,6)"    ";TAB(15,7)"    "
530ENDPROC
```

Random choice
by Stuart Maclaren

Programming

A cubist plot on ZX81

***Andrew Esmond** describes how to make the most of the plot command.*

The ZX81 has been criticised on its graphics side The PLOT function, however makes some very interesting effects possible

The plottable resolution on the ZX81 is a very low 64 by 44 pixels, ranging from 0 to 63 from left to right and 0 to 43 pixels from bottom to top

The 2816 pixels can be used very imaginatively For instance, the following program draws a circle

```
10 FOR F=0 TO 104
20 PLOT 32+20*SIN(F/32*PI) 22+20
   *COS(F/32*PI)
30 NEXT F
```

The program basically works by joining a sine and cosine wave The 20's in line 20 are used to determine the radius of the circle Try changing them to produce circles of different sizes

To produce spirals try setting the radius equal to a variable, say R, and reducing R by 1 each time the FOR-NEXT loop is executed Why not try altering the value of one of the radii in the PLOT statement to produce oval shapes?

To produce a circle with a thicker outline use PRINT AT Remember that the coordinates start in a different place the top lefthand corner of the screen and also there are half as many points to be plotted

There are also a couple of things to remember when using SIN COS and TAN for drawing

1 The computer works in radians instead of degrees so that for every 360° there are 2*PI radians

2 Always use something to enlarge the result of a trig — SIN, COS and TAN — operation The results alone are very small and consequently are not very interesting

3 If the operand — the thing you perform the function on — is greater than 2*PI the computer will reduce it so that it lies between zero and 2*PI

The ZX81 does not have an in-built line drawing function There are however, many of these about, so I will assume that you have access to one To draw a square all you need to do is send five sets of co-ordinates to your subroutine — five sets as it must join the fourth corner to the first

To draw a cube all that is needed is to superimpose two squares upon each other and join up their corners This will produce a skeleton cube If you want to conceal hidden faces you must devise a way of stopping your program plotting inside the foreground

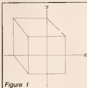


Figure 1

This is quite simple, although it is extremely slow on the ZX81, and is ideally done in machine code

The best cube can be drawn by starting the second cube in the centre of the first The following program draws a cube on the screen It is best run in fast mode if you are not interested in seeing the lines drawn

Lines 100 to 320 set up the arrays which store the cube 340 to 450 plot the foreground square 470 to 580 the background square and 590 to 670 join them up

I have left the line drawing routine to your choice This program will run in 16K although quite a lot can be done in 1K if memory conserving steps are taken The random blobs which occur on the 1K model do not appear on the 16K

I think the 1K chip may have something to do with this If you know the cause why not write in and let other users know

Three dimensional graphics can be done by using sines and cosines to modify the points plotted There are still many graphic things to be done on a ZX81 I hope I have given you some ideas

```
100 DIM A(4)
110 DIM B(4)
130 DIM C(4)
140 DIM D(4)
150 REM ***LOAD ARRAYS
    WITH COORDINATES
160 REM **A() AND B() ARE
    THE X AND Y COORDS OR THE
    FOREGROUND CUBE, C() AND
    D() ARE THE POINTS.
170 LET A(1)=10
180 LET B(1)=10
190 LET A(2)=30
200 LET B(2)=10
210 LET A(3)=30
220 LET B(3)=30
230 LET A(4)=10
240 LET B(4)=30
250 LET C(1)=0
260 LET D(1)=20
270 LET C(2)=20
280 LET B(2)=20
290 LET C(3)=20
300 LET D(3)=40
310 LET C(4)=0
320 LET D(4)=40
330 REM **DRAW FOREGROUND
    SQUARE
340 FOR F=1 TO 3
350 LET X1=A(F)
360 LET Y1=B(F)
370 LET X2=A(F+1)
380 LET Y2=B(F+1)
390 GOSUB 1000
400 NEXT F
410 LET X1=X2
420 LET X1=Y2
430 LET X2=A(1)
440 LET Y2=B(1)
450 GOSUB 1000
460 REM** DRAW BACKGROUND
    SQUARE
470 FOR F=1 TO 3
480 LET X1=C(F)
490 LET X2=C(F+1)
500 LET Y1=D(F)
510 LET Y2=D(F+1)
520 GOSUB 1000
530 NEXT F
540 LET X1=X2
550 LET Y1=Y2
560 LET X2=C(1)
570 LET Y2=D(1)
580 GOSUB 1000
590 REM**JOIN TWO CUBES
600 FOR F=1 TO 4
610 LET X1=A(F)
620 LET Y1=B(F)
630 LET X2=C(F)
640 LET Y2=D(F)
650 GOSUB 1000
660 NEXT F
670 STOP
```

Spectrum

In this new slot various contributors explore different aspects of the ZX Spectrum

A pixel plot to make you fast on the draw...

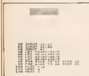
Nick Hampshire starts exploring the new computer's graphics

The Spectrum incorporates some quite sophisticated high resolution graphics capability The simplest of the high resolution commands is PLOT This simply plots a point on the screen at the coordinates specified in the parameters following the command

The plotting resolution is 256 × 192 pixels a resolution which is quite adequate for most applications To display a point on the screen at a location 100 pixels in the X direction and 50 pixels in the Y direction the command would be

```
PLOT 100 50
```

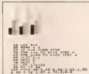
A single pixel point occupies a space which is 1/64th of a normal character There are 8 × 8 pixels in a character space The PLOT command can be used to fill areas of the screen with dots When used in conjunction with the correct colour commands this can create blocks of colour This program shows you how this can be done



In line 10 the input command requests the coordinates of the centre of the block The height and width of the block are input in line 20 The input command in line 30 requests the spacing between dots in the block This is very useful since it allows one to create blocks of different density

By plotting blocks of points of different densities a range of different displays can be created In the following program a barchart is displayed which shows three goups of bars each representing three figures Each related bar has the same density of dots displayed

It should be noted that the algorithm used in this program for plotting a block of dots is much simpler than that used in the previous program since it is the bottom left corner of the block which is specified rather than the centre



In line 20 the height of the bar and the density of the dots in the bar are obtained from a DATA statement The data statement is located in line 100 Note that the end of data is signalled by a double 0 data which is detected by line 25

The other principle Spectrum high resolution command is DRAW This command draws a straight line from the last plotted point to a point specified in the coordinate parameters following the DRAW command The problem with the DRAW command is that it is relative to the last plotted point rather than using absolute coordinates

Thus the DRAW command obtains the absolute end coordinates of the line by using the last plotted point as the beginning coordinates and adding to these the relative offset coordinates following the DRAW command

A further complication is that in order to determine whether the new end line is closer to the x or y origin than the last plotted point the relative coordinates can be negative

The complexities of the DRAW command are shown in the following example witich draws a border around the screen



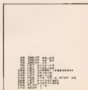
Line 10 specifies the start point, x, y origin, which is at the bottom right corner of the screen Line 20 draws the bottom horizontal line line 30 the right vertical, line 40 the top horizontal and line 50 the left vertical

Just as bars of dots could be used to create barcharts so rectangular boxes can be used to display values in a barchart The next program does just this



Note that this routine like the previous barchart program used data statements to store the information required to display each bar This data is read in line 10 where the coordinate of the bottom right corner of the bar is obtained, x and y variables, plus the bar width — w — and height h

The problems involved in using the DRAW command can to a degree be overcome by using a line drawing routine written in Basic The main problem with this is that it is considerably slower than the machine-code DRAW command The algorithm is fairly simple and can be speeded up by not printing every dot in the line The program requires five parameters These are, start of line x and y coordinates — line 10 — end of line x and y coordinates — line 20 — and the spacing between dots on the line



You pay your money and take your choice!

***Sam Blythe** presents a comparison of the most popular micros*

The most common question we are asked every day is "Which computer should I buy?" Too many people assume that there is an easy answer, that on any one day there is a best computer.

This, of course, is totally wrong. There is a very wide range of computers on the market. Prices start from £69 for the ZX81 and go up to well over £1,000 for some models which are still moderately popular with some home users.

The most fundamental question before you start looking is "How much money do you have?" For most people the choice is then made.

The next question, once you have decided on your price bracket, is "What do you actually want to use it for?" Are you mainly interested in playing arcade style games, writing your own programs in Basic, dabbling with machine code or starting your own software business? I would not seriously recommend using a ZX81 for business or office use, for example.

To help you choose I have drawn up this comparison table of some of the most important features of the most popular computers on the market at the moment. Although the top price is £399 for the BBC model B it does not take long to spend considerably more on software and hardware add-ons such as printers and disc drives.

This was very much a personal comparison based on my own experience of using each of the computers. I have only had a limited time on the Spectrum but the main features are unlikely to change now, despite the design fault reported on page 5.

The table is not exhaustive, but it should give you some idea of what to expect for your money.

The conclusion is that different machines are best for different people, just like cars. Remember that once you have made your decision you will have to live with it, and pay for it.

If you have the money then the BBC machine certainly offers the widest range of facilities.

Make	Sinclar ZX81	Spectrum	Acorn Atom	Commodore Vic	BBC
Price	£69.95	16k £125 48k £175	RRP £174 (note 4)	RRP £199	model A £299 model B £399
Processor	Z80	Z80A	6502	6502A	6502A
RAM (note 1)	1k	16k or 48k	2k	3.5k	16k model A 32k model B
ROM	8k	16k	8k		16k Basic+ 16k operating system
Relative speed	very slow	slow in hi-res mode	fast Basic	2MHz. (fast)	2MHz. (very fast)
Cassette	** 300 Baud tacky	doesn't work	*** 300 B good once set up	***** reliable but needs special unit (£45)	***** 300 & 1200 Baud cassette motor
Keyboard	* (poor)	**	*** Ascii	***** Ascii	***** Ascii
Power Supply	*** external need bigger pack for printer & Ram pack	*** external	*** external some problems	*** external some problems	**** internal
Printer	*	** same as ZX81 but higher Res	****	**** same as Atom	interfaces to any printer
Sound	none	** crude	* very crude	**** 3 voices +noise	***** 3 voices+noise and envelope Speech available
Graphics rows × columns	* 24 × 32	**** 24 × 32	*** 16 × 32	**** 23 × 22	*****
Hi-res pixels	72 × 64	192 × 256	192 × 256 (note 2)	176 × 158	320 × 256 model A 640 × 256 model B
Character set	non Ascii	Ascii	256 chrs Ascii	Pet-type graphics+ alphanumerics	256 Ascii
Colour	none	8 only to nearest chr	4 (note 3)	16	16
Basic	** non-standard	*** fairly standard	*** highly non-standard	**** very good	***** like Microsoft but structured
DATA/READ	no	yes	yes	yes	yes
DO UNTIL	no	no	yes	no	yes
multiple statements	no	yes	yes	yes	yes
Auto line numbering	no	no	no	no	yes
Verify	no	yes	no	yes	no
Assembler	no	no	yes	no	yes, very good
Ports	special port	same but bigger RS232 soon	via chip and lots of pins Econet.	joystick port, plug in socket floppy port and modem	floppy port Econet serial and parallel ports. Bus extension for teletext. Tube connects to other computers
Expansion	wide range of good add-ons	Microdrives printer expect many more	small range but easy to adapt.	joysticks paddles light-pen more coming	the BBC micro is designed for expansion.
Sum up	the old stalwart is showing its age	bug-ridden and crude but best value	out-of date but excellent second hand value	games machine and fine computer cash.	the Rolls-Royce computer may be built into a full-blown system
Value for money	***	*****	**	*	****
Educational value	***	****	***	****	****
Games value	**	****	***	*****	****

Note 1) Ram supplied with Basic machine
Note 2) needs extra Rom and Ram
Note 3) needs extra hardware
Note 4) Atom price is for assembled 2k version. Excellent deals are available on Atoms making them much better value.

Sound & vision



Sound out that envelope

Among the many tantalising mysteries hinted at but not solved by the provisional BBC Microcomputer User Guide is the ENVELOPE statement. Even when this is explained it can seem a daunting task to experiment with the computer's full sound generating capabilities.

The ENVELOPE statement requires 14 parameters and must be used in conjunction with a complete SOUND statement which itself involves eight parameters! All this for each sound.

The greater the attack rate, the more rapidly the sound reaches full volume. The decay, sustain and release rates define the way in which the note fades. The peak and sustain levels determine the volume of the sound.

The pitch of the note may be varied up or down during the first three phases of the sound (phase 4 is merely the dying away period — corresponding to keeping your finger down on a piano key).

The accompanying program enables the user to change each parameter at will and hear the result whilst displaying the current values on the screen.

Just for starters, once the program is loaded, you might care to try changing the initial set values as follows:
RR −1, PS1 1, PS2 −1, PS3 25, NS1 50, NS2 50, SL 100

Kevin Rooke

```
10 REM SOUNDTEST BY K.ROOKE
20 PITCH = 100:L - 50
30 S = 0:PS1 - 0:PS2 = 0:PS3 = 0:NS1 = 0:NS2 = 0:NS3 = 0:AR = 0:
   DR - -1:SR = 0:RR = 0:PL = 120:SL = 0
40 CLS
50 PRINT
60 PRINTTAB(0,0);"S-DURATION 0/255 -":PRINTTAB(30,0);S
70 PRINTTAB(0,1);"PS1=PITCH STEP -128/127 =":PRINTTAB(30,1);PS1
80 PRINTTAB(0,2);"PS2=PITCH STEP -128/127 -":PRINTTAB(30,2);PS2
90 PRINTTAB(0,3):"PS3=PITCH STEP -128/127 =":PRINTTAB(30,3);PS3
100 PRINTTAB(0,4);"NS1=NO. OF STEPS 0/255 -":PRINTTAB(30,4);NS1
110 PRINTTAB(0,5);"NS2-NO. OF STEPS 0/255 =":PRINTTAB(30,5);NS2
120 PRINTTAB(0,6);"NS3=NO. OF STEPS 0/255 -":PRINTTAB(30,6);NS3
130 PRINTTAB(0,7);"AR=ATTACK RATE 1/127 =":PRINTTAB(30,7);AR
140 PRINTTAB(0,8),"DR-DECAY RATE -127/127 =":PRINTTAB(30,8);DR
150 PRINTTAB(0,9);"SR=SUSTAIN RATE 0/-128 -".PRINTTAB(30,9);SR
160 PRINTTAB(0,10);"RR-RELEASE RATE 0/-128 -".PRINTTAB(30,10),RR
170 PRINTTAB(0,11);"PL-PEAK LEVEL 0/126 -":PRINTTAB(30,11),PL
180 PRINTTAB(0,12);"SL=SUSTAIN LEVEL 0/126 -".PRINTTAB(30,12);SL
190 PRINTTAB(0,13);"PITCH   0/255   =":PRINTTAB(30,13),PITCH
200 PRINTTAB(0,14),"LENGTH  0/ ?    =":PRINTTAB(30,14);L
210 ENVELOPE 1,S, PS1,PS2,PS3,NS1,NS2,NS3, AR,DR,SR,RR,PL,SL
220 SOUND &0001,1,PITCH,L
230 PRINTTAB(0,17);"TYPE R FOR REPEAT NOTE"
240 PRINTTAB(0,18),"OTHERWISE TYPE THE LETTER(S)"
250 PRINTTAB(0,19);"WHICH YOU WANT TO CHANGE"
```

```
260 INPUT Q$
270 IF Q$ = "R" THEN 210
280 IF Q$ = "S" THEN 430
290 IF Q$ = "PS1" THEN 450
300 IF Q$ = "PS2" THEN 470
310 IF Q$ = "PS3" THEN 490
320 IF Q$ = "NS1" THEN 510
330 IF Q$ = "NS2" THEN 530
340 IF Q$ = "NS3" THEN 550
350 IF Q$ = "AR" THEN 570
360 IF Q$ - "DR" THEN 590
370 IF Q$ = "SR" THEN 610
380 IF Q$ - "RR" THEN 630
390 IF Q$ = "PL" THEN 650
400 IF Q$ = "SL" THEN 670
410 IF Q$ = "PITCH" THEN 690
420 IF Q$ = " LENGTH" THEN 710
430 INPUT S
440 GOTO 40
450 INPUT PS1
460 GOTO 40
470 INPUT PS2
480 GOTO 40
490 INPUT PS3
500 GOTO 40
510 INPUT NS1
520 GOTO 40
530 INPUT NS2
540 GOTO 40
550 INPUT NS3
560 GOTO 40
570 INPUT AR
580 GOTO 40
590 INPUT DR
600 GOTO 40
610 INPUT SR
620 GOTO 40
630 INPUT RR
640 GOTO 40
650 INPUT PL
660 GOTO 40
670 INPUT SL
680 GOTO 40
690 INPUT PITCH
700 GOTO 40
710 INPUT L
720 GOTO 40
```

Our classifieds are faster.

Do you want to sell your computer and buy a bigger and better one?

Have you ever thought of trying to make some money out of selling tapes of your own programs?

Whatever it is you want to buy or sell why not use our classified pages?

It has to be better than waiting for up to nine weeks to get into one of the old monthly magazines.

Not only that, but our rates are very reasonable.

For private individuals it only costs 20p per word, with a minimum of 10 words.

We can make it so cheap because we charge companies using the classified columns 40p per word.

The classified pages can be used for semi-display advertising.

The cost for this is £10 per single column centimetre, with a minimum charge of £30.

All copy for the classified pages must be pre-paid. (You'll find a handy form on page 22)

Cheques and postal orders should be made out to *Popular Computing Weekly*. Your advertisement should arrive at least two weeks before the publication date.

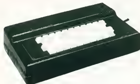
If you have any queries regarding Classified or semi-display advertising please call Alastair Macintosh on 01-930 3840.

Popular Computing Weekly.

The fast one.

FULLER FD SYSTEM £39.95

Professional Keyboard & Case for Sinclair ZX81



The ZX81 fits inside
The tough ABS injection moulded plastic case measures 8 x 14 x 2½ and hooks up to your ZX printed circuit board in minutes No technical know how or soldering is required

KEYBOARD LAYOUT.
All the Sinclair ZX81 keys are duplicated on our layout with extra shift and new line keys The professional momentary action key switches have a guaranteed life of 10^6 operations The unit is fully built tested and comes complete with a money back guarantee





INSTALLATION
Simply unscrew the ZX printed circuit board from its case and screw it into the FD Case

MOTHERBOARD.
We also manufacture a mother board which allows expansion to the ZX memory and I/O facilities WITHIN the case as well as our power supply unit and reset switch

AD Code

	Price	Qty	Amount
Fuller FD System 42 Keyboard & case	39 95		
FD System Motherboard	15 95		
FD 16K Memory Module	29 95		
FD 64K Memory Module	78 95		
FD PSU 9 Volts at 2 amp	12 95		
FD *Shipping and Handling*	2 50		

Mail to **FULLER MICRO SYSTEMS.**
The ZX Centre Sweeting Street Liverpool 2 England U K

Name

Address

City/State/Zip